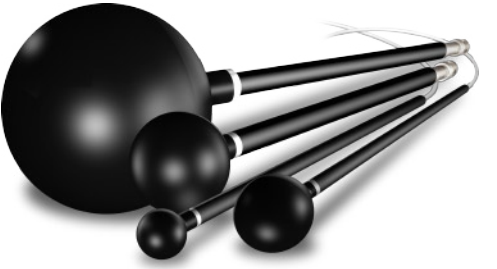


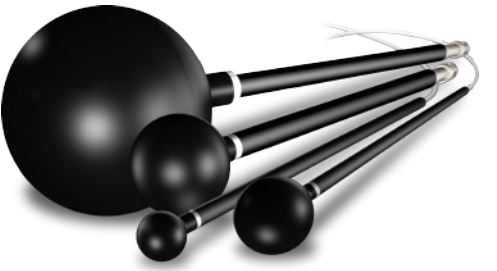
EXRADIN®

A3 / A4 / A5 / A6 Spherical
Ionization Chambers

REF 92717 / 92715 / 92724 / 92716

Standard Imaging®

User Manual



EXRADIN®

A3 / A4 / A5 / A6 Spherical
Ionization Chambers

REF 92717 / 92715 / 92724 / 92716

STANDARD IMAGING INC.
7601 Murphy Drive
Middleton, WI 53562-2532

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DOC #80360-03

General Precautions

Warnings and Cautions alert users to dangerous conditions that can occur if instructions in the manual are not obeyed. Warnings are conditions that can cause injury to the operator, while Cautions can cause damage to the equipment.

WARNING:
Electrical shock hazard when connected to 300 V bias supply.

CAUTION:
Proper use of this device depends on careful reading of all instructions and labels.

CAUTION:
Do not drop, mishandle, or disassemble unit since it may result in change of calibration factor, or damage. Refer all servicing to qualified individuals.

CAUTION:
Do not sharply bend triax cable. Damage to the cable may result in high leakage currents.

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EXRADIN®
Standard Imaging®
7601 MURPHY DRIVE
MIDDLETON, WI 53562-2532 USA
WWW.STANDARDIMAGING.COM

General Operation

The **Exradin** A3 and A4 Spherical Chambers are attached to a 1.5 m length of low-noise flexible triaxial cable that is terminated by a triaxial or coaxial connector. The Exradin A5 and A6 Spherical Chambers utilize the exact same triaxial cable, however, it is only 22.9 cm long and concealed inside the chamber's stem. The cable is terminated by the triaxial connector mounted directly to the end of the stem. In either case, the collector of the chamber is common with the center wire of the cable and the center contact of the connector. The guard is common with the inner cable braid and the middle connector contact in the case of triaxial connectors, and the connector body in the case of coaxial connectors. The shell (outer electrode), usually ground, is common with the outer braid of the cable and the connector body in the case of triaxial connectors, and the pigtail extending out the rear of coaxial connectors.

Operating Instructions

1. With nothing connected to the input jack of the electrometer, turn the power on and wait at least 15 minutes for warm up.

2. Verify the leakage of the electrometer is within the manufacturer's stated acceptable limits.

3. Connect the ionization chamber to the electrometer and apply 100% voltage bias.

4. Allow the electrometer and ionization chamber system at least 10 minutes to stabilize, making certain that all cabling is lying flat and unkinked.

5. Verify the leakage of the ionization chamber is within the manufacturer's stated acceptable limits. If measured in the presence of background sources, note that this signal will add to the leakage of the chamber.

6. Some electrometers, such as the Standard Imaging MAX-4000 Electrometer, allow the user to zero the device at any time. If desired, perform this system zeroing now.

7. Check the system leakage. Take a reading without exposing the chamber to radiation. This reading should be less than 0.1% of the final signal expected. If it is not, the leakage should be subtracted from the signal.

8. Measure atmospheric temperature and pressure. For well chambers, measure the temperature in the well of the chamber.

9. Insert the ion chamber and take at least 3 measurements. Generally, the measurements should not be moving in only one direction (i.e. three readings that continue to drop and hence may not yet be stabilized). If a current measurement is done, allow sufficient time for value to stabilize.

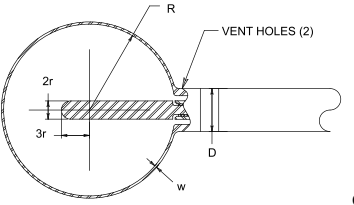
10. Analyze the data taking into account the average of the readings, system leakage, temperature/pressure corrections, calibration factors and any other appropriate corrections to be made. Keep in mind that the calibration factor consists of the electrometer calibration and the ionization chamber calibration factor.

11. When all measurements are completed, set bias voltage to 0 VDC, turn off the electrometer and disconnect the ionization chamber.

Parts and Accessories

REF	Description
72106	A3 Co-60 Buildup Cap, 2.3 mm, C552
72107	A3 Buildup Cap, 5.6 mm, Delrin
72108	A3 Buildup Cap, 8.5 mm, Delrin
72109	A3 Buildup Cap, 11.5 mm, Delrin
72110	A4 Co-60 Buildup Cap, 2.0 mm, C552
72111	A4 Buildup Cap, 11.0 mm, Delrin
72113	A5 Buildup Cap, 8.5 mm, Delrin
70004	10 m Triaxial Extension Cable - BNC connectors with protective caps

Features and Specifications



MODEL	R mm	r mm	w mm	D mm	Stem Diameter mm	Collecting Volume cc	Calibration Factor* R/nC (nominal)
A3	**9.7**	**1.0**	**0.25**	**7.9**	**7.9**	**3.6**	**0.9**
A4	**19.1**	**2.0**	**0.50**	**9.5**	**9.5**	**30**	**0.09**
A5	**28.4**	**3.0**	**3.0**	**15.9**	**15.9**	**100**	**0.03**
A6	**57.2**	**5.8**	**3.0**	**22.2**	**15.9**	**800**	**0.004**

*nominal calibration factors for energies greater than 200 keV

Collecting Volume:	See table
Collector Diameter:	2r (see table for values of r)
Shell Wall Thickness:	w (see table for values of w)
Shell, Collector, and Guard Material:	Shonka air-equivalent plastic C552
Stem (A3 & A4):	Black phenolic; see table for diameters; length is 22.9 cm; not removable
Stem (A5 & A6):	Delrin; see table for diameters; length is 22.9 cm; not removable
Waterproof:	No; this sort of chamber is not used in water
Venting:	Two holes, open to the ambient, are located on the neck of the chamber
Buildup Caps Available:	**A3** – 2.3 mm wall C552 (Co-60), 5.6 mm wall Delrin, 8.5 mm wall Delrin, 11.5 mm wall Delrin **A4** – 2.0 mm wall C552 (Co-60), 11.0 mm wall Delrin **A5** – 8.5 mm wall Delrin **A6** – None
Connector:	Triaxial BNC Plug (2-Lug Male) and protective cap connected by chain (standard); others available upon request
Low-Noise Triaxial Cable:	1.5 m long (A3 & A4 only); 50 ohms; 29 pF/ft
Nominal Inherent Leakage Currents:	10^{-15} A
Maximum Polarizing Potential:	1000 V
Temperature Range:	15-32 °C
Humidity Range:	20-80%, non-condensing
Pressure:	650 to 770 mm Hg

Features and Specifications

Recommended Bias for Chamber Use:	A3 - 300V A4 - 500V A5 - 800V A6 - 1000V
Nominal Collection Efficiency:	100% at recommended bias
Product Standards:	IEC 60601-1[1] CE 0413

[1] Designed to Meet

Notes

Notes

Service Notes

Buildup Caps
To remove buildup caps from these ionization chambers, use the following procedure: Hold the buildup cap in one hand, allowing the chamber handle to hang freely. Insert a small screwdriver or similar tool into the neck hole and simply pry the cap open. The prying force is to act between the cap and handle. In this manner, buildup caps are readily removed without stressing the chamber proper. It is important that the handle is not held while opening buildup caps. Hold chamber by cap and permit handle to respond freely to prying force.

Stem
The stem is an integral part of the ionization chamber assembly and is not to be removed under any circumstances.

Venting
The chamber volume is vented to the ambient via (2) vent holes located on the neck of the shell.

Service and Maintenance
There are no user-serviceable parts within these ionization chambers. Under no circumstance should the user attempt to repair or disassemble the chamber and/or connector, as the warranty will become void and the calibration factor will change. Under normal use, the chambers should provide years of trouble-free service.

If assistance is desired in the proper disposal of this product (including accessories and components), after its useful life, please return to Standard Imaging.

Service Policy

If service, including recalibration, is required, please contact Standard Imaging's Customer Service department by phone or email prior to shipping the product. Standard Imaging's Customer Service and Technical Service staff will attempt to address the product issue via phone or email. If unable to address the issue, a return material authorization (RMA) number will be issued. With the RMA number, the product can be returned to Standard Imaging. It is the responsibility of the customer to properly package, insure and ship the product, with the RMA number clearly identified on the outside of the package. The customer must immediately file a claim with their carrier for any shipping damage or lost shipments. Return shipping and insurance is to be pre-paid or billed to the customer, and the customer may request a specific shipper. Items found to be out of warranty are subject to a minimum service fee of 1 hour labor (excluding recalibrations) for diagnostic efforts and require a purchase order (PO) before service is performed. With concurrence from customer, the product may be replaced if it is unserviceable or if the required service is cost prohibitive. Products incurring service charges may be held for payment. Standard Imaging does not provide loaner products. See the Standard Imaging Warranty and Customer Responsibility for additional information.

Customer Responsibility

This product and its components will perform properly and reliably only when operated and maintained in accordance with the instructions contained in this manual and accompanying labels. A defective device should not be used. Parts which may be broken or missing or are clearly worn, distorted or contaminated should be replaced immediately with genuine replacement parts manufactured by or made available from Standard Imaging Inc.

CAUTION: Federal law in the U.S.A. and Canadian law restrict the sale, distribution, or use of this product to, by, or on the order of a licensed medical practitioner. The use of this product should be restricted to the supervision of a qualified medical physicist. Measurement of high activity radioactive sources is potentially hazardous and should be performed by qualified personnel.

Should repair or replacement of this product become necessary after the warranty period, the customer should seek advice from Standard Imaging Inc. prior to such repair or replacement. If this product is in need of repair, it should not be used until all repairs have been made and the product is functioning properly and ready for use. After repair, the product may need to be calibrated. The owner of this product has sole responsibility for any malfunction resulting from abuse, improper use or maintenance, or repair by anyone other than Standard Imaging Inc.

The information in this manual is subject to change without notice. No part of this manual may be copied or reproduced in any form or by any means without prior written consent of Standard Imaging Inc.

Warranty

Standard Imaging, Inc. sells this product under the warranty herein set forth. The warranty is extended only to the buyer purchasing the product directly from Standard Imaging, Inc. or as a new product from an authorized dealer or distributor of Standard Imaging, Inc.

For a period provided in the table below from the date of original delivery to the purchaser or a distributor, this Standard Imaging, Inc. product, provided in the table is warranted against functional defects in design, materials and workmanship, provided it is properly operated under conditions of normal use, and that repairs and replacements are made in accordance herewith. The foregoing warranty shall not apply if the product has been altered, disassembled or repaired other than by Standard Imaging, Inc. or if the product has been subject to abuse, misuse, negligence or accident.

Product	Warranty Period
Standard Imaging Ionization Chambers	2 years
Standard Imaging Well Chambers	2 years
Standard Imaging Electrometers	2 years
Standard Imaging Software Products	1 year
All Other Standard Imaging Products	1 year
Standard Imaging Custom Product	90 days
Consumables	90 days
Serviced Product	90 days
Resale Products	As defined by the Original Equipment Manufacturer
ADCL Product CalibrationADCL Product Calibration (Standard Imaging uses the UW-ADCL for recalibrations required under warranty)	0 - 90 days = 100% of ADCL Calibration Costs 91 - 182 days = 75% of ADCL Calibration Costs 183 – 365 days = 50% of ADCL Calibration Costs 366 – 639 days = 25% of ADCL Calibration Costs (days from date of shipment to customer)

Standard Imaging's sole and exclusive obligation and the purchaser's sole and exclusive remedy under the above warranties are, at Standard Imaging's option, limited to repairing, replacing free of charge or revising labeling and manual content on, a product: (1) which contains a defect covered by the above warranties; (2) which are reported to Standard Imaging, Inc. not later than seven (7) days after the expiration date of the warranty period in the table; (3) which are returned to Standard Imaging, Inc. promptly after discovery of the defect; and (4) which are found to be defective upon examination by Standard Imaging Inc. Transportation related charges, (including, but not limited to shipping, customs, tariffs, taxes, and brokerage fees) to Standard Imaging are the buyer's responsibility. This warranty extends to every part of the product except consumables (fuses, batteries, or glass breakage). Standard Imaging, Inc. shall not be otherwise liable for any damages, including but not limited to, incidental damages, consequential damages, or special damages. Repaired or replaced products are warranted for the balance of the original warranty period, or at least 90 days.

This warranty is in lieu of all other warranties, express or implied, whether statutory or otherwise, including any implied warranty of fitness for a particular purpose. In no event shall Standard Imaging, Inc. be liable for any incidental or consequential damages resulting from the use, misuse or abuse of the product or caused by any defect, failure or malfunction of the product, whether a claim of such damages is based upon the warranty, contract, negligence, or otherwise.

This warranty represents the current standard warranty of Standard Imaging, Inc. Please refer to the labeling or instruction manual of your Standard Imaging, Inc. product or the Standard Imaging, Inc. web page for any warranty conditions unique to the product.